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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/781,931	02/20/2004	Jia Wei	01640445AA	9709

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EXAMINER

BEHM, HARRY RAYMOND

ART UNIT	PAPER NUMBER
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2838

DATE MAILED: 12/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

5/4

Office Action Summary	Application No. 10/781,931	Applicant(s) WEI ET AL.	
	Examiner Harry Behm	Art Unit 2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 5-20 is/are rejected.
- 7) ☒ Claim(s) 2-4 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 6/24/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claims 2 and 3 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims 2 and 3 describe the intended load, the electrical device, instead of the claimed invention, the voltage regulator.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
3. Claims 5 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
4. Claim 5 recites the limitation "said selected voltage for control" in the final line of the claim. There is insufficient antecedent basis for this limitation in the claim.
5. Claim 10 recites the limitation "a said voltage" in the final line of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35

U.S.C. 102 that form the basis for the rejections under this section made in this

Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1, 5, 6, 8, 10, 11, 12, 14, 15, 17, 19 and 20 are rejected under 35

U.S.C. 102(e) as being anticipated by Liu (US Pub 20040076024).

8. With respect to Claims 1 and 14, Liu discloses a voltage regulator (Fig. 5 50) for an electrical device having a plurality of operating modes having differing current consumption (Para 6 In some applications, e.g., voltage regulator for a CPU, the load may change suddenly or violently. In particular, a CPU needs only a tiny current when it is idle and drains a huge current when it becomes very busy), said voltage regulator comprising a regulator stage (Fig. 5 54) having an input for receiving an input voltage (Fig. 5 V_m), and a V_{bus} supply regulator stage (Fig. 5 52) having an input (Fig. 5 64) for receiving information (Fig. 5 63) corresponding to an operational mode of said electrical device and supplying a voltage (Fig. 5 V_m) corresponding to said operational mode or said current consumption as said input voltage to said regulator stage.

9. With respect to Claim 5, Liu discloses a voltage regulator as recited in claim 1, further comprising a ramp generator for generating a ramp waveform (Fig. 4 Ramps) having an amplitude corresponding to said selected voltage for control of said regulator stage.
10. With respect to Claims 6 and 15, Liu discloses a voltage regulator as recited in claim 1, further including a feedback loop (Fig. 4 V_{FB}) in said V_{bus} supply regulator stage (Fig. 5 52).
11. With respect to Claims 8 and 17, Liu discloses a voltage regulator as recited in claim 6, further including a feedback loop (Fig. 7 V_{FB1}) in said regulator stage (Fig. 5 54) including signal paths for signals corresponding to output voltage (Fig. 7 V_{FB1}) and output current (Fig. 5 63) of said voltage regulator, respectively.
12. With respect to Claims 10 and 19, Liu discloses a voltage regulator as recited in claim 8, further including a connection (Fig. 5 64) for supplying said signal corresponding to said output current (Fig. 5 63) to said feedback loop of said V_{bus} supply regulator stage (Fig. 5 52) for making an adjustment (Fig. 7 835) to a said voltage (Fig. 5 V_m).
13. With respect to Claims 11 and 20, Liu discloses a voltage regulator as recited in claim 10, wherein said adjustment to said voltage provides a continuous range of voltages (Fig. 5 V_m).
14. With respect to Claim 12, Liu teaches a voltage regulator as recited in claim 11, wherein said regulator stage (Fig. 5 52) comprises a plurality of parallel

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voltage regulator circuits (FIG. 1 shows a simplified single-channel or single-phase voltage converter or one channel of a multi-phase or multi-channel voltage converter).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 7, 9, 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu (US Pub 20040076024) in view of Kingsepp.

17. With respect to Claims 7, 9, 16 and 18 Lui teaches the invention set forth above. Lui does not explicitly detail the use of R_{tilt} or R_{droop}. Kingsepp teaches a signal path for the signal corresponding to output voltage (Fig. 2 V_{out}) to include an R_{droop} resistor (Fig. 2 R_{droop}). Kingsepp is analogous art because it relates to the reliability of parallel power supplies. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the feedback resistor of Kingsepp into the regulator of Liu for the purpose of improving transient performance and for the parallel voltage regulators in the second stage to more equally share the load current.

18. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over . Liu (US Pub 20040076024) as applied to claim 12 above, and further in view of Schuellen (US Pub 6806689).
19. With respect to Claim 13, Lui teaches the invention set forth above. Lui does not explicitly mention wherein operation of selected ones of said parallel voltage regulator circuits may be discontinued in response to current load requirements. Schuellen teaches that the output phase arrangement (Fig. 2 110) operates to switch off both the high-side and low-side switches (Fig. 2 205, 210) in response to the occurrence of a decrease in current demand of the load (Fig. 2 135). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the second stage regulator of Liu with the parallel voltage regulator circuits of Schuellen for the purpose of enhancing the response time of the multi-phase buck converter and prevent disadvantageous negative currents from flowing through the output inductor and possibly damaging the power supply (¶ 15).

Allowable Subject Matter

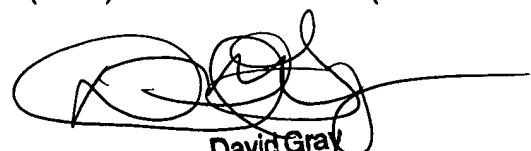
20. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
21. The following is a statement of reasons for the indication of allowable subject matter: the prior art does not suggest the use of two nearly discrete

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values for a first regulator stage voltage being passed to a second regulator stage and substituting a discrete regulator into the first stage of the prior art would degrade the performance of the second stage.

Conclusion

22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Walters (US 6,278,263), Liu (US 6,414,470) and Seo (US Pub 20050001599) teach the use of multi-phase converters.
23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Behm whose telephone number is 571-272-8929. The examiner can normally be reached business hours EST.
24. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Gray can be reached on 571-272-2119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.
25. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


David Gray
Primary Examiner